

REMARKS

Applicants respectfully request that the amendments be entered at least because they raise no new issues requiring further search or consideration, and because they place the application in condition for allowance.

Claim 7 is requested to be cancelled without prejudice or disclaimer.

Claims 1, 5 and 6 are currently being amended. Support for the amendments to claims 1 and 5 can be found at least in Tables 1 and 2 on pages 8 and 14, respectively, of the present specification, and the accompanying text. Claim 6 has been amended to be consistent with the amendment to claim 1. New claims 8 and 9 have been added. No new matter has been added.

This amendment changes, adds and deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1, 3, 5, 6, 8 and 9 are now pending in this application.

Examiner Interview

Applicants appreciate the courtesies extended by Examiner Jose Diaz in the personal interview of April 5, 2004. A substance of that interview is provided in the Interview Summary of that date, which is of record in the present application. During the interview, applicants representative, Thomas Bilodeau, presented proposed amendments to claims 1 and 5 (the amendments to claims 1 and 5 of the present Amendment). Examiner Diaz suggested that the amendments may constitute a new issue requiring further search and consideration. Accordingly, applicants present the present amendment as a submission accompanying a Request for Continuing Examination (RCE), so that the amendment will be considered by the examiner.

Rejection under 35 U.S.C. § 103

Claims 1, 3 and 5-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0 840 361 A2 to Cheung et al. (hereafter “Cheung”). Applicants respectfully traverse this rejection for at least the following reasons.

Independent claims 1 and 5 have been amended to clarify that silicon-oxide-based film is formed by using SiH₄ and N₂O as material gases at a reaction temperature of over 400 °C, and the nitrogen content of a surface of the silicon-oxide-based film is between about a value of 0.01 atm% to 0.08 atm%. Cheung does not suggest these features of claims 1 and 5.

Cheung discloses depositing a capping layer or hardmask using SiH₄ and N₂O as source gases (col. 19, lines 38-48). In contrast to the presently claimed invention, however, the capping layer or hardmask is formed at a temperature of 300-400 °C (col. 20, lines 28-31). As shown in the present specification in Tables 1 and 2, silicon-oxide-based films formed at respective temperatures of 300 °C, 350 °C, and 400 °C using SiH₄ and N₂O as material gases has a higher nitrogen content at the surface of the film as compared to films formed at reaction temperatures of over 400 °C. Thus, the presently claimed invention provides a silicon-oxide-based film with a beneficially lower nitrogen content at the surface.

Moreover, Cheung does not appreciate that increasing the deposition temperature for forming the capping layer or hardmask would lower the nitrogen content at the surface. In light of Cheungs failure to recognize that increasing the deposition temperature lowers the nitrogen content at the surface, the temperature range as claimed constitutes more than a mere optimization of parameters, but instead represents unexpected results. Thus the present invention is not obvious over Cheung.

Still further, Cheung does not disclose or suggest the specific range of nitrogen content recited in claims 1 and 5 of 0.01 atm% to 0.08 atm%. In the present claims 1 and 5, nitrogen must be included at the surface of the silicon-oxide-based film in some amount. By contrast, Cheung teaches that little or none of the nitrogen is incorporated into the capping layer or hardmask (see col. 19, lines 49-50). Thus, the present invention as claimed is essentially different from the disclosure of Cheung.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date April 12, 2004

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